E4000 air quality probe Installation manual

Ver	Date	Modification / Update
V1	Initial	Version Initial/Initial version
V9	Sep 2012	Initial mass prod version
V10	Nov 2012	Air proof wiring
V11	Dec. 2012	Temperature sensor position
V12	May 2013	LED option + High performance Positioning
V13	Oct 2013	Complementary KNX power supply

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1. Security

WARNING
Danger of death, risk of electric shock and fire!
The installation should only be undertaken by a qualified electrician!

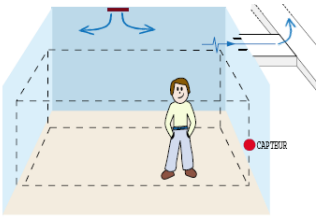
To apply for correct bus and power cables and to activate the device, comply with the state of the art and standards.

Any intervention or modification to the device will invalidate any warranty claim.

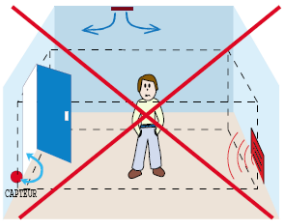
• Do not use this probe in environments with regular exposure to chlorine fumes (hospitals, swimming pools ..!) because this gas gradually alters the sensitivity of the CO2 solid state sensor. Use the NDIR sensor in such environment.
• Do not use the sensors for measuring gas content relating to safety!
• Use the probe only with secured low voltages!
• Use an external 24VAC or DC power supply capable of delivering 60mA per probe and ensuring a peak voltage under 40V or use the KNX bus power supply considering 50mA per probe.

2. Positioning

The position of the probe is crucial vis-à-vis efficiency and energy savings for ventilation, heating and cooling.



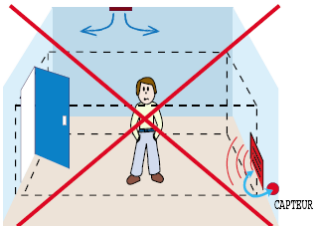
• The probe is designed to ensure air quality; it must be placed in the area of occupancy of the premise served by outlet vents, on a wall at eyes level (breathing human level, between 1.5 and 1.8m).



• Avoid drafts (near openings, blowing air, doors, outlet vents) and dead zones (niche, shelves and curtains).

• Avoid orthogonal walls (corners of room in particular)

• Avoid heat sources and the proximity of occupants (radius of 1 m from workstation).



• Avoid direct exposure to sunlight.

• Position the sensor vertically on a wall or partition.
This device is not intended for installation in duct or ceilings.

• When used with an EnOcean radio module, see the complementary positioning constraints § 7.2.4.4 - Transmission Range, Page 11

Any work not in accordance with this documentation or changes to the device will invalidate all warranty claims.

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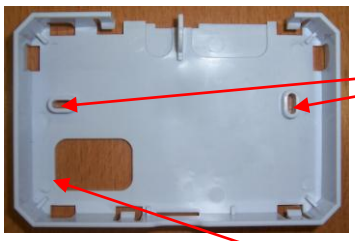
3. Installation

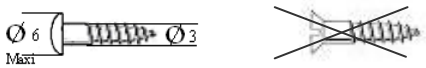
Attach to the wall through two holes in the case.

TOP

Take care of case orientation (TOP –BOTTOM)



ONLY use screws with bent heads
Maximum height of the head 2 mm.



BOTTOM

Make sure to position the hole of cables path at the case bottom

4. Wiring

Be careful, wiring must be sealed. Incoming air, even slight, would seriously jam the temperature, humidity and air quality measures.

When the switchboard is located in the heated volume: caulk arrivals between cables and ducts at the switchboard level.

When the switchboard is out of the heated volume, caulk between cables and ducts before entering the heated volume. A sealing plug must also be placed between duct and cable reaching the E4000 probe to prevent air entry.

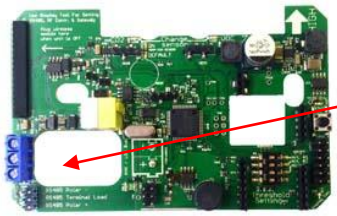
When the sealing of the duct is not possible, use a specific sealant without silicone and VOC.

In case of use of electrical box, select an airtight case with sealing membrane from which the duct passes through. If the case crosses through the sealing plane (plasterboard), seal between the casing and panel with a special sealant without silicone and VOC.

5. Motherboard preparation

5.1. RS485

The RS485 interface is resident on the motherboard



RS485 Modbus

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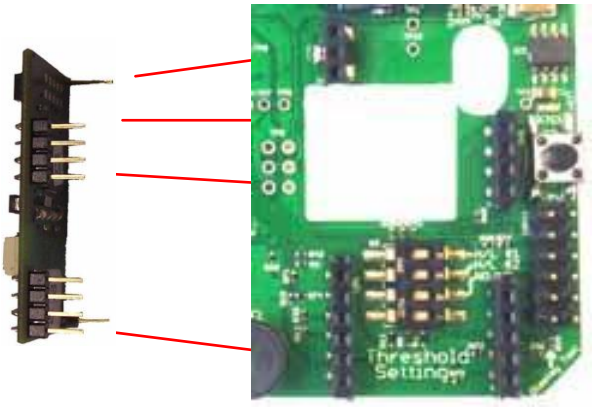
5.2. Optional Bus board

5.2.1. Install the daughter board

KNX board

LON board

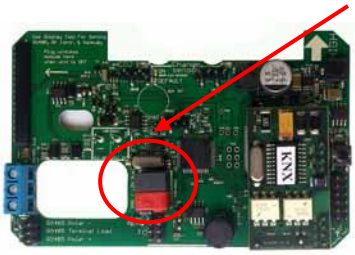
POE board



Insert the Bus board into the motherboard of the probe. Check that there is no shift in the connectors.

5.2.2. Mount the BUS connector

BUS plug *Ethernet plug*

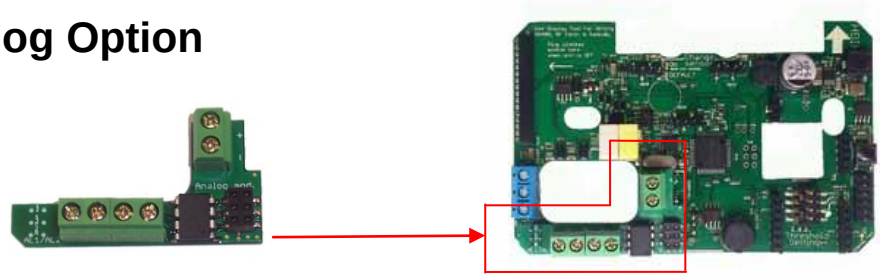


Motherboard with KNX

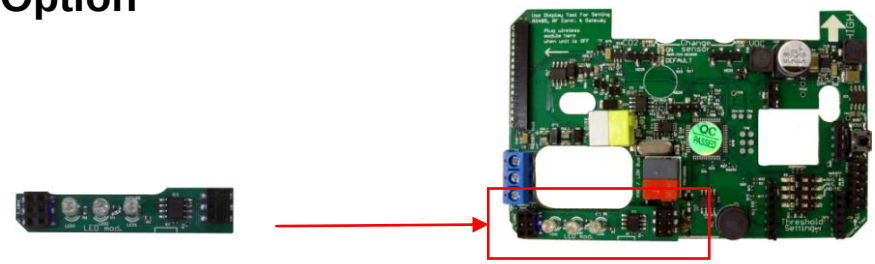
Motherboard with LON

Motherboard with POE

5.3. Analog Option



5.4. LED Option



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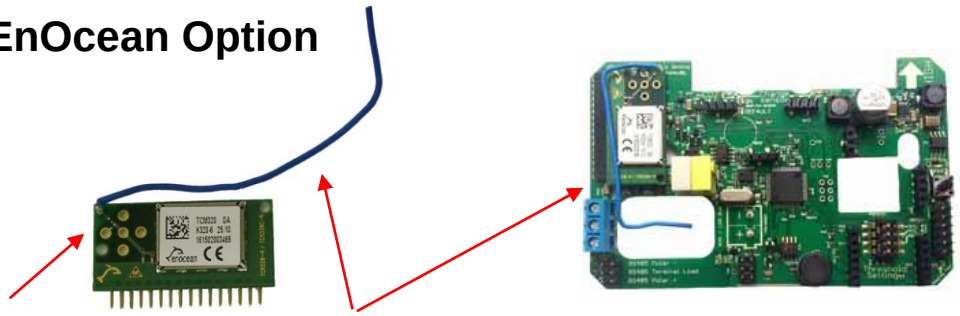
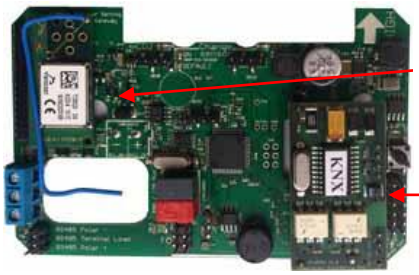
5.5. EnOcean Option



EnOcean radio module *Antenna*

For good receiver performance, great care must be taken about the space immediately surrounding the antenna since this has a strong influence on screening and detuning the antenna. The antenna should be drawn out as far as possible and must never be cut off. Mainly the far end of the wire should be mounted as far away as possible (at least 15 mm) from all metal parts, ground planes, PCB strip lines and fast logic components (e.g. microprocessors). Do not roll up or twist the whip antenna!

5.6. Gateway EnOcean-KNX Option



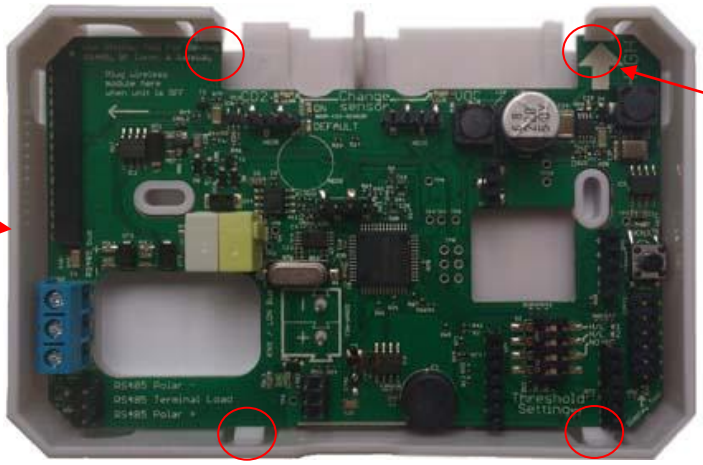
EnOcean module

KNX module

Note: Gas sensors must be installed after the connections and before power on.

6. Install the motherboard into the case

Clip the mother board into the case



Case

The arrow on the board indicates the top position

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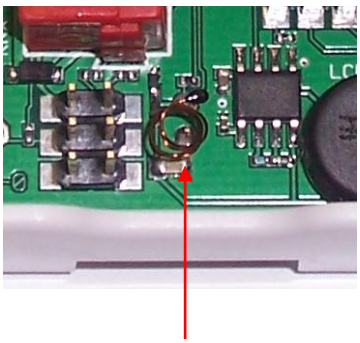
6.1. Temperature sensor

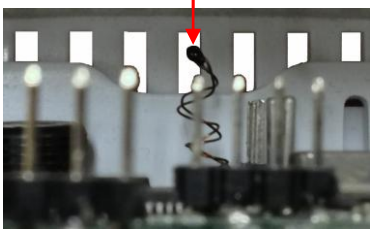
6.1.1. Standard positioning



Temperature sensor

The temperature sensor is located on the lowest part of the board.
This sensor is located at the end of a coiled pigtail 3cm long conductor to minimize thermal bridging with the board and thus reduce the thermal inertia. In addition the metal used is constantan. This alloy is a good electrical conductor and a good thermal insulator which further reduces the thermal the thermal bridge with the board. So in case of sudden temperature change (window opening), the probe reacted very quickly.

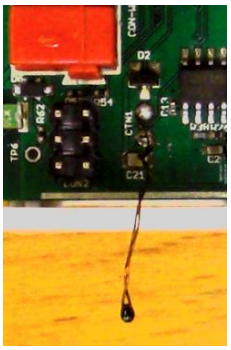
For an accurate measurement, it is necessary that the sensor (the little black ball) be in the air stream.
Pull lightly on the sensor to make it exceed by 3 mm from the dished shape recess in the plastic housing. Do not overpass 6mm to avoid touching the plastic cover.



A gentle stream of air is generated by the heating of the CO2 and VOCs sensors located in the upper part. The incoming air is immediately measured by the temperature sensor.

6.1.2. High performance positioning

The here under optimum positioning of the temperature sensor eliminates thermal phenomena in the containment housing and improves accuracy.



Stretch the twisted cable of the sensor in pulling it down. Put the cover from the bottom by inserting the sensor into the vent.
Check visually and make sure not to exceed the border for aesthetic reasons.

7. Connecting

7.1. Power Supply

7.1.1. Power Supply Characteristics

Use a power supply between 12 and 24V AC or 15 and 33V DC with a fluctuation of max value of less than 10%, preferably a DIN rail regulated one.

Make sure the voltage does not overpass 24V AC or 33V DC before connecting to the E4000 probe.

Take into account the voltage drop in cable to assess the consumption of each sensor.

In RS485 version add 13mA to the calculated consumption. Probes are queried one after the other.

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In KNX version, the bus powers only the interface board, the main board is powered by the secondary 31V–DC power supply (yellow and white).
Use a certified KNX power supply.
Most of KNX power supplies have a secondary 31V-DC power supply (yellow and white cables and connector of the same colors).

In LON version use a 24V power supply independent from the bus.

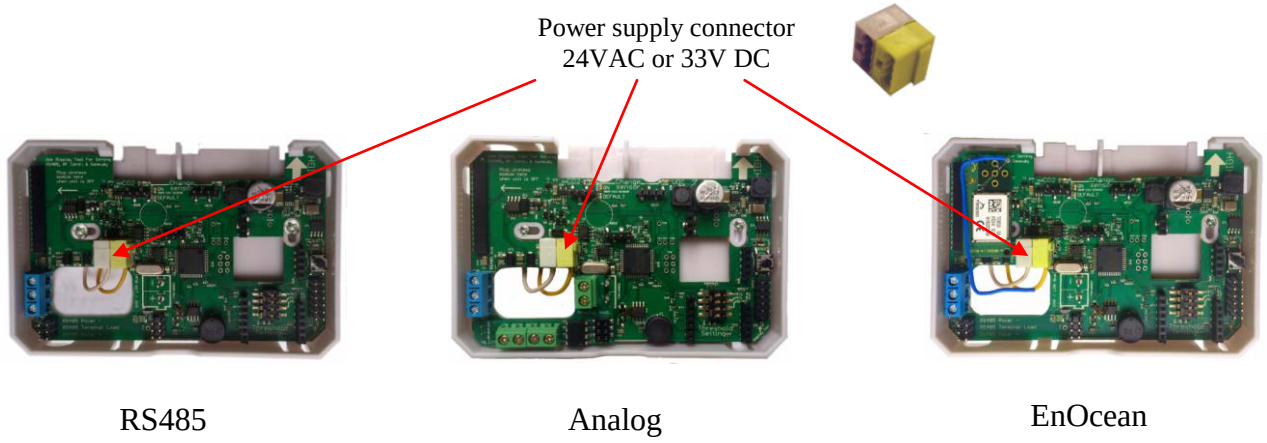
In POE version, consumption is about 30mA.

Installation sample	RS485	KNX	LON	POE
Per Unit consumption	45 mA	40 mA	40 mA	30 mA
20 probes connected	20* (45 + 13) mA To be adjusted for voltage losses in long cables worn.	20*40 = 800 mA Δ Security : 20 % = 160 mA Power supply :1 A	20*40 = 800 mA Δ Security: 20 % = 160 mA Power supply : 1 A	20*30 = 600 mA Δ Security: 20 % = 120 mA Total 720 mA

7.1.2. Power supply connection

In all cases but POE, the probe requires a power supply separated from the bus

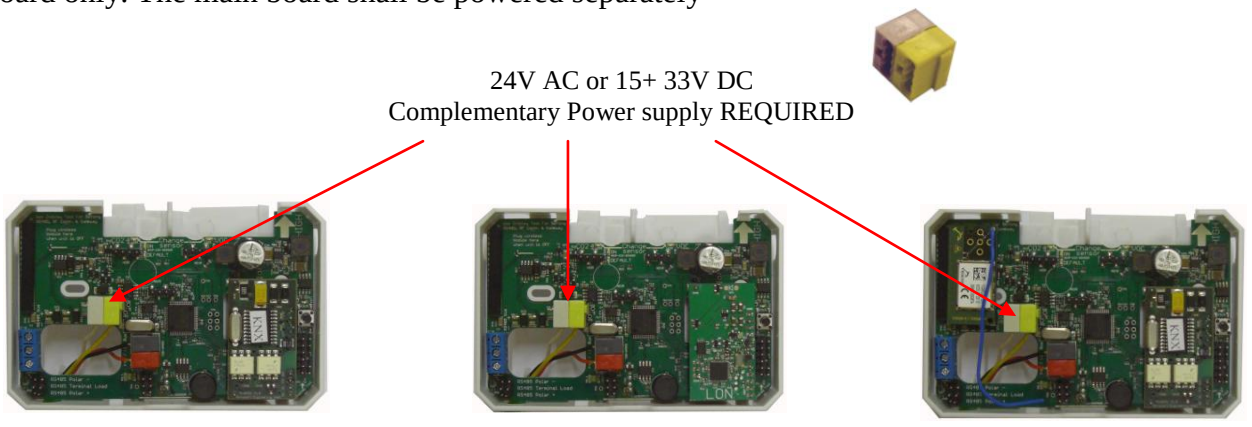
7.1.2.1. RS485, Analogical, EnOcean, KNX and LON



RS485 Analog EnOcean

The power supply connector is designed for monofilament cables from 0,6 to 0,8 mm of Ø. Reveal the wire on 5 mm. It is not necessary to respect the polarity.

The KNX or LON power supply cable allows receiving and sending data and powering the interface board only. The main board shall be powered separately



KNX LON EnOcean/KNX Gateway

For cable selection, refer to § Choice of cables attached in the annex.

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Note: KNX EnOcean Gateway

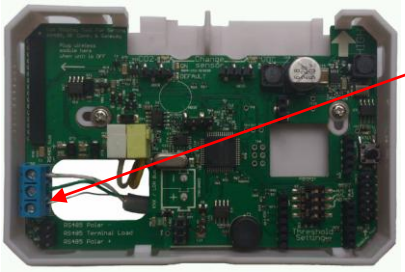
Connecting the EnOcean module enables the gateway function between KNX and EnOcean.
In addition to the gateway function, this module is used to enrich the functions between the EnOcean sensors and EnOcean actuators by KNX settings. The pairing between the gateway and EnOcean devices requires prior setting of KNX communication object via ETS. The pairing is then made through the buttons of the LCD tool panel.
For detailed on settings, refer to the KNX manual setting.
Without wire bus interface board, the probe becomes an EnOcean sensor.

7.1.2.2. POE Bus

Connect the Ethernet cable to the POE module.
The Ethernet cable provides power.

7.2. Connecting to ventilation and other elements

7.2.1. RS485



\+
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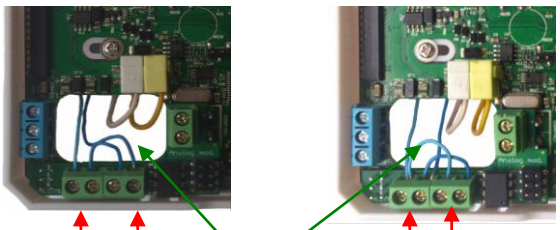
N

Measures and orders are transmitted via the RS485 Modbus.
The cable must be twisted. For the selection of cable refer to §Choosing Cable Bus page 19

For more details on the connection, see annex § Installation of BUS connections page 17

7.2.2. Analog Option

HVAC one speed

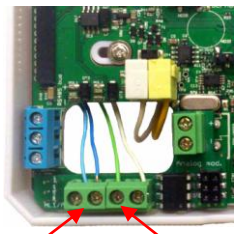


HVAC 1-1
Logic NC

Bridge outputs (see 9.2)

HVAC 1-2
Logic NO

HVAC two speeds



HVAC 1 HVAC 2

HVAC continuous

0-10 V Output

See diagrams on page 16

0-10V output corresponds to VOC, CO2 and HR combined. (See technical specification for details)

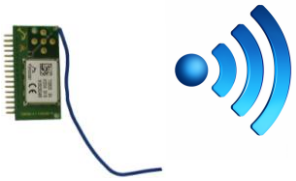
7.2.3. KNX or LON Sensor Mode

Liaison with HVAC and heating is by KNX or LON wire (twisted pair). HAVC, heating and air conditioning must be compatible KNX or LON

7.2.4. EnOcean sensor mode option

Principle

The link with the HVAC is done by radio waves.



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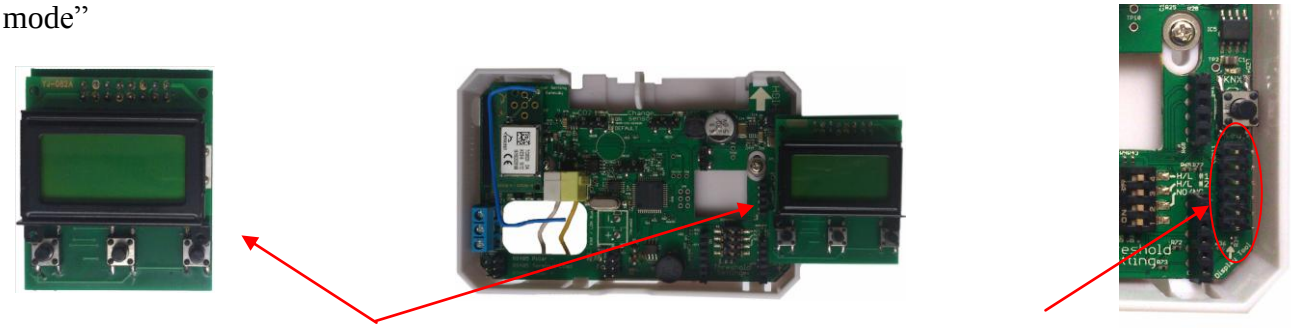
7.2.4.1. Pairing

In order to send the measured values or commands to actuators, it is necessary that the probe to be paired with one or more actuators. This is achieved through "the LCD tools" temporarily mounted on the probe. Details are described in the document "Setting the E4000 air quality probe in EnOcean sensor mode"



LCD tool *LCD tool connectors*

Beside, for temperature control, EnOcean sensors can be associated with the E 4000 probe (Ex: window handle to turn off the heating when open, presence sensor or card to switch to ECO mode)

7.2.4.2. Telegram Transmission Principle

In EnOcean sensor mode
The probe sends a telegram of a different profile every 5 seconds (if paired).

Without annex probe, the E4000 probe is sending 5 telegrams (1 for ventilation control, 1 for CO2 + Temperature & Humidity, one for VOCs, 1 for heater control, 1 for cooling control) so a 25 to 30 seconds cycle.

Telegram emissions are not conditioned by changes of measures because emission rate is enough vis-à-vis the HVAC.
This rate is not adjustable.

In EnOcean gateway mode, the probe sends telegrams according to events.

7.2.4.3. Description Radio Telegram

In EnOcean sensor mode
EnOcean profiles:
The following telegrams are sent:

• Controls for ventilation (Bi Directional)	(EEP 4BS: A5-20-02)
• Or Commands for continuous ventilation (uni-directional)	(EEP RDS: F6-02-01)
• Or Commands for single-speed ventilation (ON/OFF)	(EEP RDS: F6-02-01)
• Or Commands for Two-speed ventilation (ON/OFF)	(EEP RDS: F6-03-01)
• And CO2, Humidity and temperature Measurements	(EEP 4BS: A5-09-04)
• And VOCs Measurement	(EEP 4BS: A5-09-05)

And for temperature heating control:

• Control valve battery operated (Bi Directional)	(EEP 4BS : A5-20-01)
• Or Control valve Basic (Bi Directional)	(EEP 4BS : A5-20-02)
• Or Control valve wired (Bi Directional)	(EEP 4BS : A5-20-03)
• Or Control Generic HVAC Interface (Bi Directional)	(EEP 4BS : A5-20-10)
• Or Temperature (setting + measure)	(EEP 4BS : A5-10-03)

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And for temperature cooling control:

• Control valve battery operated (Bi Directional)	(EEP 4BS : A5-20-01)
• Or Control valve Basic (Bi Directional)	(EEP 4BS : A5-20-02)
• Or Control valve wired (Bi Directional)	(EEP 4BS : A5-20-03)
• Or Control Generic HVAC Interface (Bi Directional)	(EEP 4BS : A5-20-10)
• Or Temperature (setting + measure)	(EEP 4BS : A5-10-03)

And, if annex probes are installed:

• Radon Measurement	(EEP 4BS: A5-09-06)
• And or Particles Measurement	(EEP 4BS: A5-09-07)
• And or Ozone Measurement	(EEP 4BS: A5-09-05)

The control algorithm is similar to that of the relays (ventilation one or two speeds) and 0-10V output (continuous ventilation) of the analog module and combines the CO2, VOCs and humidity measurements.
The thresholds setting of CO2 and humidity (VOC thresholds are regulatory) is active in EnOcean sensor mode as for the analog module.

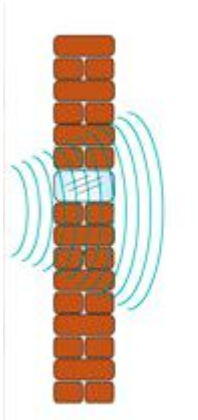
In EnOcean gateway mode
EnOcean profiles:
The gateway supports most of the EEP2.1 plus few more telegrams approved since the publication of the EEP2.1
The only exceptions are CO2 and VOC telegrams, the probe providing already those data. CO is also not handled

7.2.4.4. Transmission Range

As radio signals are electromagnetic waves, the signal is damped on its way from the sender to the receiver. That is to say, the electrical as well as the magnetic field strength is removed inversely proportional to the square of the distance between sender and receiver ($E,H \sim 1/r^2$).

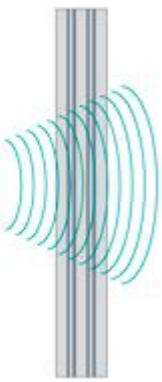
Beside these natural transmission range limits, further interferences have to be considered: Metallic parts, e.g. reinforcements in walls, metallized foils of thermal insulations or metallized heat-absorbing glass, are reflecting electromagnetic waves. Thus, a so-called radio shadow is built up behind these parts.

Building material used in a building is of paramount importance for the evaluation of the transmitting range. For an evaluation of the environment, some guide values are listed:



Brick walls/
Aerated concrete blocks
(ACB)
20 meters through
maximum 3 walls

Plaster board/
Wood (dry)
30 meters through
max. 5 walls



Reinforced concrete
10 meters through
maximum
1 wall/ceiling

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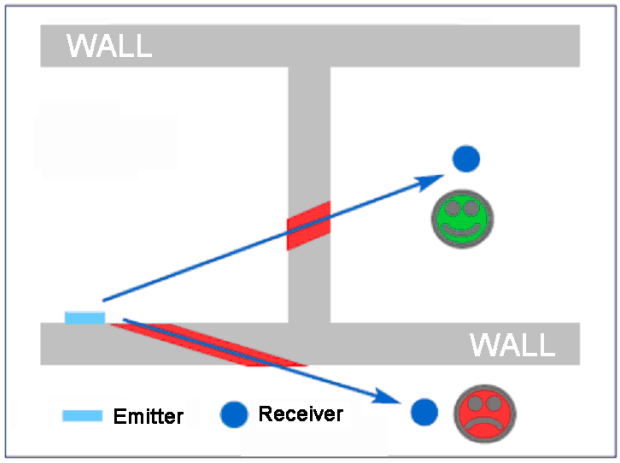
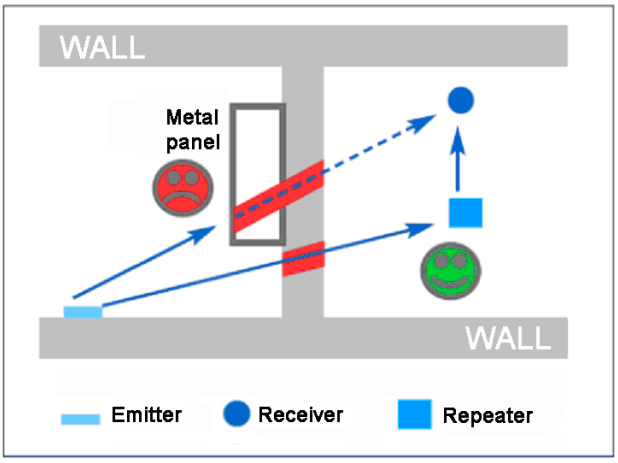
Other materials	Typical range
Air (Visual contacts)	30m in passages, corridors, up to 100m in halls
Windows with thermal insulation	5m through 1 Window maximum

Supply blocks and lift shafts should be seen as a compartmentalisation

In addition, the angle with which the signal sent arrives at the wall is of great importance. Depending on the angle, the effective wall strength and thus the damping attenuation of the signal changes. If possible, the signals should run vertically through the walling. Walling recesses should be avoided.



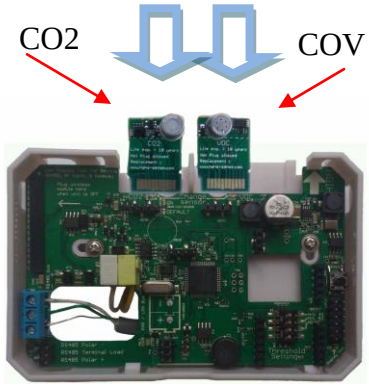


Other Interference Sources
Devices that also operate with high-frequency signals, e.g. computer, audio-/video systems, electronical transformers and ballasts etc. are also considered as an interference source.

The minimum distance to such devices should amount to 0,5m.
Find the Device Positioning by means of the Field Strength Measuring Instrument EPM100
EPM 100 is a mobile tool for measuring and indicating the received field strength (RSSI) of the EnOcean telegrams and disturbing radio activity at 868,3MHz. It supports electrical installers during the planning phase and enables them to verify whether the installation of EnOcean transmitters and receivers is possible at the positions planned. It can be used for the examination of interfered connections of devices, already installed in the building.

8. Insert gas sensors

8.1. Sensors on miniSD card



Press until it clicks. The sensor should not pop up.

CO2 and COV sensors are supplied in sealed waterproof bags .Introduce them into the slot located on the back side of the card. Well comply with locations.

Do not open pouches until ready to install sensors.

Insert the sensor when the motherboard is ready to be turned on.

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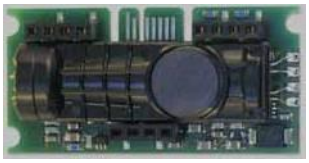
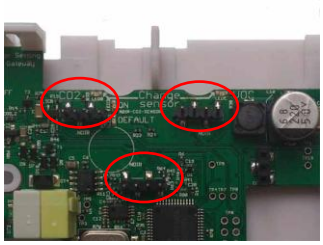
8.2. CO2 NDIR Sensor



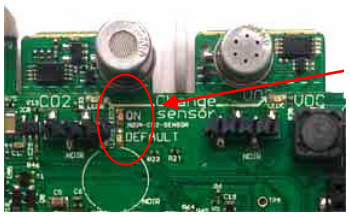


NDIR Sensor

CO2 NDIR Sensor Connectors

9. Powering

At power up, the red status LED will flash alternatively with the green LED during the initial phase of gas sensors conditioning (20 minutes), and finally the green LED will flashes every 2 seconds indicating the good functioning of the probe. During this gas sensors conditioning phase ventilation, heating and cooling commands are minimal.



Main board status LEDs

The red LED indicates defaults.

The type of failure is indicated by the number of LEDs flashing ("message") in the following order of priority of default detected:

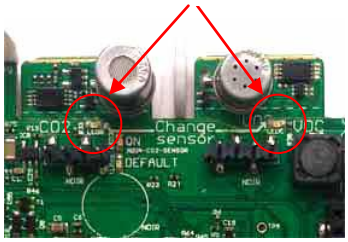
1 flash: Voltage too high (>35V DC or 25V AC)
2 flashes: low voltage (<15V DC or 10.6V AC)
3 flashes: Calibration EEPROM defective
4 flashes: Humidity sensor defective (out of range)
5 flashes: Faulty temperature sensor (out of range)

There is a break of 2 seconds between each "message"

If the red LED is continuously ON, it indicates that a KNX Bus, LON or POE daughter board has been detected but communication with the board has failed.

Each location of gas sensor also includes a red LED.
At power up, if no sensor is detected, both LEDs turn red permanent.
If a sensor is detected and the test is negative, the LED blinks rapidly.
If the test result is positive, the LED goes out.
When the sensor reaches the end of life (10 years) the red LED turns ON to request his replacement.
The countdown is on board the sensor module.

Sensors Status LEDs



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ATTENTION

After switching On !

If the CO2 solid state sensor has been stored for several weeks, it takes at least 3 days to get an accurate value.

With firmware before December 13th 2013, starting values can commonly exceed 2500 ppm then decrease gradually.

With firmware after December 13th 2013, starting value is 390ppm and the sensor will gain in sensitivity gradually.

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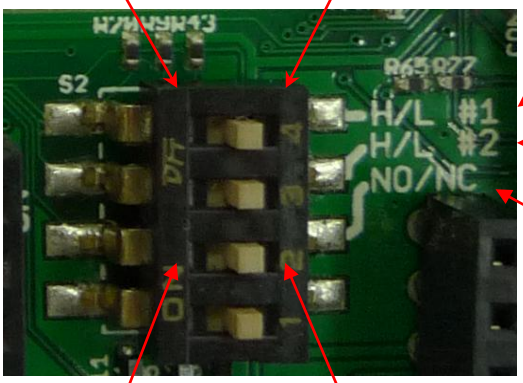
10. Configuration (EnOcean, Modbus RS485 and Analogical Board)

10.1. Position the micro switches

Two dry contacts of analog board (speed 1 and 2) or RS485 & EnOcean commands operate based on CO2, VOCs and RH parameterized thresholds by three micro switches:



1 Thresholds: CO2: 500 ppm or 900 (selectable) / 0.5 ppm formaldehyde equivalent (VOCs) or 75% RH over 20 minutes. H = High / L = Low

2 Thresholds: CO2: 1250 or 1800ppm (selectable) or 3 ppm formaldehyde equivalent (VOCs) or 85% RH over 5 minutes. H = High / L = Low

1&2 Operating action contact: Normally Open (NO) or Normally Closed (NC).

In EnOcean sensor mode: Unique threshold selection # 1 or # 2 (# 1= NO, # 2 =NC)

Dry contacts type: Isolation 3750 Vrms / 1 min, 30VDC / 0.6 A max.

Hysteresis of contacts: CO2: 100 ppm, VOC: 10% of the formaldehyde threshold equivalent, RH: 10% of the threshold.

0/10V output is a mix of CO2, VOC and humidity (with an OR function: the most significant prevailing over others). The speed 1 threshold corresponds to 0.68V and 5.32V threshold to speed 2. Nevertheless there is always a minimum of 10% ventilation so 1V.

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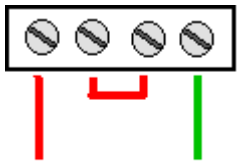
CO2 Baselines expressed in ppm

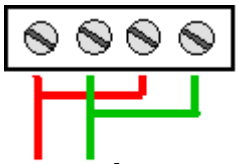
200 000		Lethal (deadly) for humans
100 000		Lethal in 10 minutes without an action for resuscitation
40 000		Threshold of irreversible effects on health
5000		Maximum concentration on workplace (8h)
4000		Bedroom poorly ventilated
1000		Significant decrease in intellectual performance. Factor for asthma or building syndrome. Maximum value allowed inside buildings.
390		Outside air

10.2. Connection diagram according to position of micro switches

Connection with negative logic (NC) for one speed ventilation.
The two micro-switches 1 and 2 in NC position.

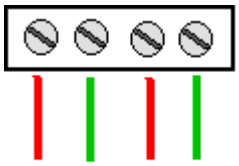


Connection with positive logic (NO) for one speed ventilation.
The two micro-switches 1 and 2 in NO position.



To ventilation

Connection with positive or negative logic for two speed ventilation.
The two micro-switches in the position proper to each speed.

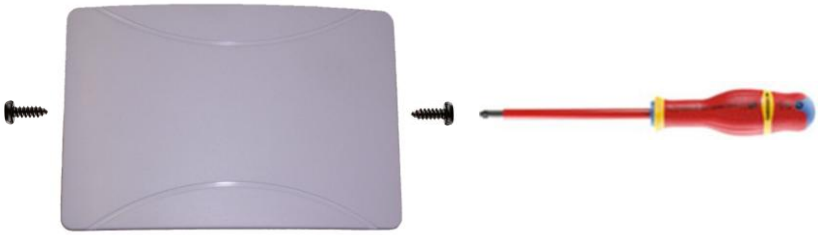


11. Completion of installation

By clipping close the cover (the cover is symmetric and therefore can be mounted upside down)

Apart from domestic installations, it is preferable to secure the cover using the two screws.

The cover and housing have pre lateral holes.



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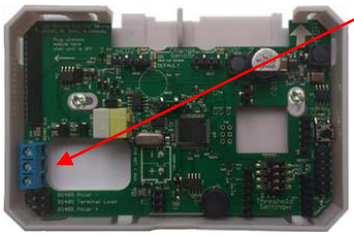
ANNEXES

1. Installation of BUS connections

1.1 RS485



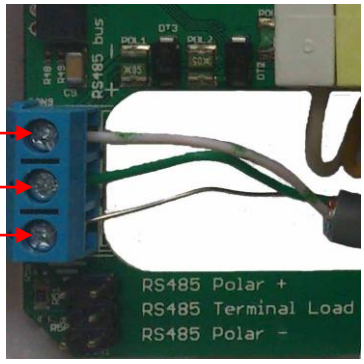
RS485 Modbus Connection

- (A)

+ (B)

Shielding of the cable *****

*** : Never connect to the – of the power supply.**



RS485 Modbus connection is not optically isolated. Therefore, you must pay special attention during the installation procedures that they do not cause communication failures or does not damage the RS485 coupler. Follow the points in the table below to ensure proper operation of your communication.

1 Use a shielded bus cable and connect one end of the shield to ground. Make sure, wherever possible, that there is no break in the cables. If this is not possible, you must have shield continuity consistent with the EMC at the connection points.

2 Keep RS485 cables away from other cables like power cables for example.

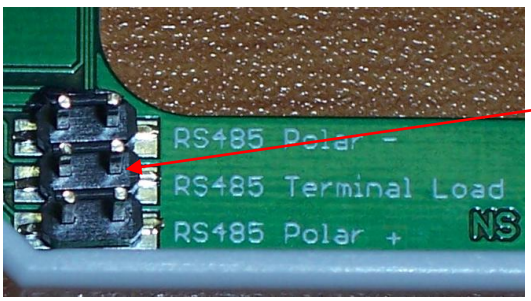
3 Connect the shielding to one end grounded to ensure equipotentiality of the shield.
No other grounding is required.
The "Shield" terminal of the power supply terminal block is isolated and is intended to facilitate the continuity of shielding.

THE SHIELD BUS MUST NOT BE CONNECTED TO THE "-" OF THE BUS.
Warning: If you do not comply with above, the interface may be destroyed.

4 Make sure electrical signals are correct for the bus cable. This sets the resting level of the signal between two posts and is important for identifying the beginning of a message. The E4000 probe produces a 5V electrical signal. The voltage between the data lines + (B) and - (A) should be between 0.5 and 1V.

5 For bus cable lengths over 100m, make sure to activate the bus termination at both ends. A bus termination on one side only is sufficient for shorter distances. Bus termination, on E4000 probe side, is provided by a jumper (see picture below).

6 The polarization of the bus is also highly recommended using the two other jumpers.
RS485 standard requires a differential level of 200 mV for the signal detection. If the RS485 is not polarized, this level will not be reached at rest (without communication on the line) and then the operation will not be guaranteed. For this, a bias is applied to only one point of the bus. It is preferably applied to the master side.



Activation of the RS485 bus termination and polarization by placing three jumpers.

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1.2 Programming the physical address

In slave mode, it is possible to program directly the probe address by using buttons on the LCD tool. (up to address # 255). A default address is implemented and the probability that two sensors have the same address is 1 / 250 which prevent setting. See document "Setting the E4000 air quality probe in RS485 mode"
« Paramétrage de la sonde de qualité de l'air E4000 en mode capteur RS485 »

1.3 Choice between RTU and ASCII

Thanks to the LCD tool, it is possible to choose between ASCII and RTU. Default bus is RTU.

1.4 RS485Annexes probes

When a daughter board is installed (EnOcean, KNX, LON, POE), the motherboard interrogates annex probes and the bus becomes the master. Data from annex probes are sent via the daughter card. The bus in this case is in ASCII mode. Check that annex probes Radon, Particle and or Ozone are in ASCII mode or version.
Select the address of each annex probe between 1 and 32.
If the E4000 probe detects several probes of the same type, it will only take into account the first detected (lowest address).

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2. Choosing Cable Bus

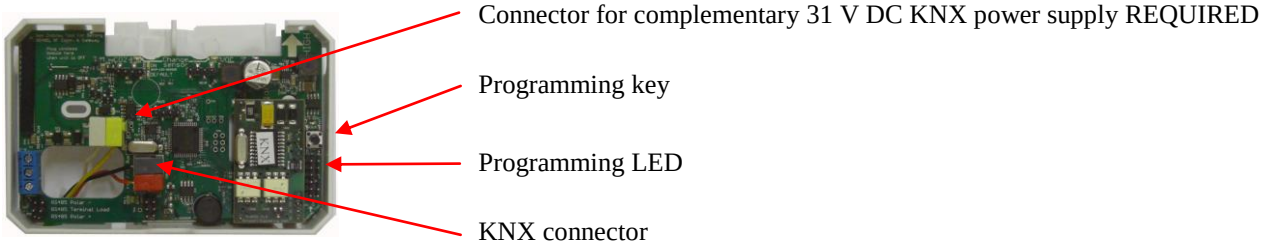
2.1. RS485

The RS422 standard recommends 24AWG (0.23mm2) twisted pair cable with a capacity of 16 pF shunt per foot and 100 ohm characteristic impedance. Although the standard does not specify anything for RS485 wiring, the cable can perfectly be used for RS485.

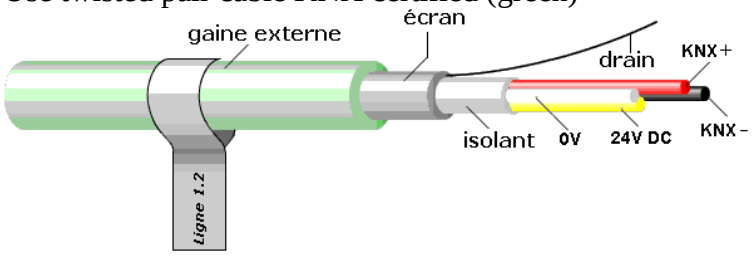
2.1.1. Topology

The topology of RS485 cabling must be observed. The cable must go to the first bus coupler device, leave the first device to the second, etc. .. until the last device.
The topologies in tree, branch or star are not allowed.

2.2. KONNEX

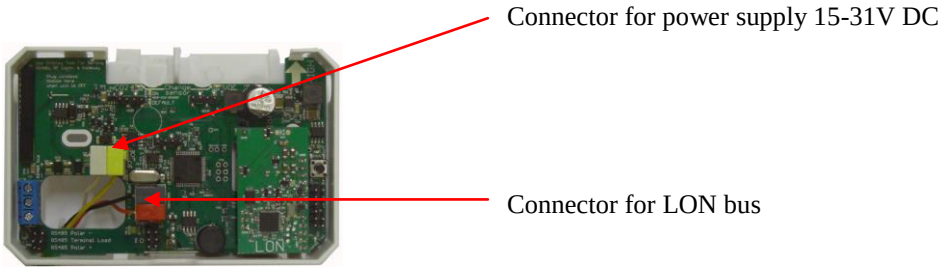


Use twisted pair cable KNX certified (green)



Board and bus being connected, press the programming button.
The programming LED lights on. Beware if the bus is not connected, the interface KNX board will not be powered and the motherboard cannot communicate with it. (Red LED continuous).
The probe is in programming mode.
Commissioning and configuration of the probe is made via ETS (KNX Tool Software).
For the setting details, refer to the KNX manual setting.

2.3. LONWORKS



Use twisted pair cable recommended for LON:
Generic 16AWG cable (1.3mm diameter) (similar to Belden 8471 or 85102)
Cable NEMA Level 4 (This cable is not equivalent to TIA Category IV cable)
TIA Category 5 cable
JY (St) Y for specific applications in Europe.
Commissioning and configuration of the probe is made via LONMAKER software or equivalent.
For the setting details, refer to the LON manual setting

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2.4. POE

Use an Ethernet cable

3. Ventilation Control

The different measurements are used to control the ventilation based on applications.

The table below summarizes which sensor to use for each application:

	Control					
Application	**CO2**	**CO2 NDIR**	**VOC**	**Humidity**	**Temperature**	**Particles**
Office						
Individual	☺	☺	☺	NA	☺	NA
Open space	☺	☺	☺	NA	☺	NA
Meeting room						
Small	☺	☺	☺	NA	☺	NA
large	☺	☺	☺	NA	☺	NA
Amphitheatre	☺	☺	☺	NA	☺	NA
Restaurants						
Main room	☺	☺	☺	NA	☺	NA
Kitchen	😐	😐	😐	☺	😐	☺
Public buildings						
Swimming pool / Hospitals	*	☺	😐**	☺	☺	NA
Theatres	☺	☺	☺	NA	☺	NA
Other	☺	☺	☺	NA	☺	NA
Housing /Hotels						
Bath rooms	😐	😐	☺	☺	☺	NA
Bed rooms	☺	☺	☺	NA	☺	NA
Living rooms	☺	☺	☺	NA	☺	NA
Industrials premises	☺	☺	☺	😐	☺	😐
Shops	☺	☺	☺	NA	☺	NA
Parking, Garages	NA**	NA***	NA**	NA**	NA**	NA**

☺	Especially recommended
😐	Satisfactory
NA	Not Adapted
*	The environment is too aggressive for CO2 solid state gas sensors because of recurring chlorine vapors. Use NDIR optional sensor
**	With regular change of sensor
***	Use of CO sensors and specific Low Speed, High Speed management. NanoSense offers specific solutions for car parks.

Note that a humidity outdoor sensor and/or a temperature outdoor sensor can be coupled with E4000's humidity and temperature sensors to optimize ventilation.

Example:
If indoor air is too humid (risk of developing mites) and outdoor air is drier, an air renewal will lower the inside humidity. On the contrary, if the outside air is more humid than indoor air, we can only play on the temperature.

A Particles sensor, a Radon sensor and an Ozone sensor (under development) can be handled by the E4000 probe with specific associated control.

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4. Specification

Power supply from 15 to 33V DC and from 12 to 24V AC (preferably DC to minimize ageing)
Consumption on KNX or LON bus: 9mA max (only for interface board)
Consumption on 24V AC or 31V DC: 45 mA (+10 mA during RS485 communication)
RS485 bus interface resident
KNX bus interface module: Optional board (TP1 / E mode)
LON bus interface module: Optional board
EnOcean: Optional radio module
Analog: 2 dry contacts and 1-10V: Optional board
Ambient temperature range: 0 ° C to +45 ° C
Protection class: III
Protection grade: IP 30
Applicable Standard: EN 60730-1 (electrical controls for household machines and the like)
Case: 135 x 90 x 28 mm

The unit complies with European Directive 73/23/EEC (Low Voltage Directive) and 89/336/EEC (EMC Directive).
KNX:
The ETS database and the LON Plug-In are available on line on www.nano-sense.com

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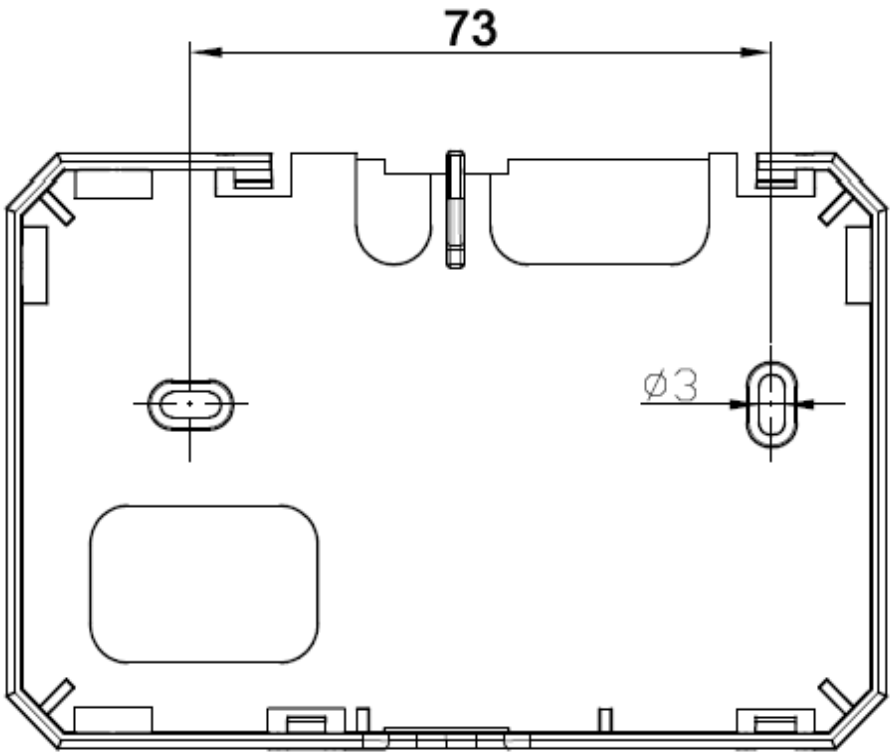
DRILLING



This drawing is at scale one and can be use directly for drilling in removing this sheet.

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